OPTIMISATION

**Example 1**: Two adjoining rectangular yards share a boundary. There is 60 m of fencing available for the boundaries. Calculate the maximum total area for the two yards.

x

x

|  |  |
| --- | --- |
|  | y |

**Example 2**: A block of ice is shaped like a cuboid. The volume is 24 000 mm3, and the depth is 18 mm. The ice takes longer to melt if the surface area is as small as possible. Calculate the minimum surface area for this block.

y

18

x

**Example 3**: The cost of running a swimming pool is $100 per day plus $1 per swimmer who uses the pool. The number of people prepared to pay $x to use the pool can be approximated by the formula . Calculate the price of entry which maximises the profit for the pool operators.

(Profit = Revenue – Cost)

Revenue = Number of people x price of one entry

=

=

Cost = Cost for one day + (Cost per swimmer x number of swimmers)

= $100 + $1 x

= 100 +

Profit = – (100 + )

= - 100 -

Method for solving Optimisation problems:

If optimising (finding max or min) of quantity Q,

1) Differentiate Q(x). *You* *may have to write an equation for Q if it is not given.*

2) Set Q’(x) = 0 and solve for x. You are solving for x when the gradient is zero, because that is a turning point, signifying a maximum or a minimum.

3) Sub x back into Q(x) to obtain max or min value of quantity Q.